SEQUENCE LISTING

<110> Asakura, Akira
Hoshino, Tatsuo
Ojima, Setsuko
Shinjoh, Masako
Tomiyama, Noribumi

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35 40 45

Glu Asn Tyr Arg His Ser Pro Leu Thr Gln Ile Thr Thr Glu Asn Val
50 55 60

Gly Gln Leu Gln Leu Val Trp Ala Arg Gly Met Gln Pro Gly Lys Val
65 70 75 80

Gln Val Thr Pro Leu Ile His Asp Gly Val Met Tyr Leu Ala Asn Pro
85 90 95

Gly Asp Val Ile Gln Ala Ile Asp Ala Lys Thr Gly Asp Leu Ile Trp
100 105 110

Glu His Arg Arg Gln Leu Pro Asn Ile Ala Thr Leu Asn Ser Phe Gly
115 120 125

Glu Pro Thr Arg Gly Met Ala Leu Tyr Gly Thr Asn Val Tyr Phe Val
130 135 140

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Thr Phe Asp Val Asp Arg Gly Gln Gly Glu Asp Met Val Ser Asn Ser
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Ser Gly Pro Ile Val Ala Asn Gly Val Ile Val Ala Gly Ser Thr Cys
            180                 185                 190

Gln Tyr Ser Pro Phe Gly Cys Phe Val Ser Gly His Asp Ser Ala Thr
        195                 200                 205

Gly Glu Glu Leu Trp Arg Asn Tyr Phe Ile Pro Arg Ala Gly Glu Glu
    210                 215                 220

Gly Asp Glu Thr Trp Gly Asn Asp Tyr Glu Ala Arg Trp Met Thr Gly
225                 230                 235                 240

Ala Trp Gly Gln Ile Thr Tyr Asp Pro Val Thr Asn Leu Val His Tyr
                245                 250                 255

Gly Ser Thr Ala Val Gly Pro Ala Ser Glu Thr Gln Arg Gly Thr Pro
            260                 265                 270

Gly Gly Thr Leu Tyr Gly Thr Asn Thr Arg Phe Ala Val Arg Pro Asp
        275                 280                 285

Thr Gly Glu Ile Val Trp Arg His Gln Thr Leu Pro Arg Asp Asn Trp
    290                 295                 300

Asp Gln Glu Cys Thr Phe Glu Met Met Val Thr Asn Val Asp Val Gln
305                 310                 315                 320

Pro Ser Thr Glu Met Glu Gly Leu Gln Ser Ile Asn Pro Asn Ala Ala
                325                 330                 335

Thr Gly Glu Arg Arg Val Leu Thr Gly Val Pro Cys Lys Thr Gly Thr
            340                 345                 350

Met Trp Gln Phe Asp Ala Glu Thr Gly Glu Phe Leu Trp Ala Arg Asp
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Thr Asn Tyr Gln Asn Met Ile Glu Ser Ile Asp Glu Asn Gly Ile Val
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Thr Val Asn Glu Asp Ala Ile Leu Lys Glu Leu Asp Val Glu Tyr Asp
385 390 395 400

Val Cys Pro Thr Phe Leu Gly Gly Arg Asp Trp Pro Ser Ala Ala Leu
405 410 415

Asn Pro Asp Ser Gly Ile Tyr Phe Ile Pro Leu Asn Asn Val Cys Tyr
420 425 430

Asp Met Met Ala Val Asp Gln Glu Phe Thr Ser Met Asp Val Tyr Asn
435 440 445

Thr Ser Asn Val Thr Lys Leu Pro Pro Gly Lys Asp Met Ile Gly Arg
450 455 460

Ile Asp Ala Ile Asp Ile Ser Thr Gly Arg Thr Leu Trp Ser Val Glu
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Arg Ala Ala Ala Asn Tyr Ser Pro Val Leu Ser Thr Gly Gly Gly Val
485 490 495

Leu Phe Asn Gly Gly Thr Asp Arg Tyr Phe Arg Ala Leu Ser Gln Glu
500 505 510

Thr Gly Glu Thr Leu Trp Gln Thr Arg Leu Ala Thr Val Ala Ser Gly
515 520 525

Gln Ala Ile Ser Tyr Glu Val Asp Gly Met Gln Tyr Val Ala Ile Ala
530 535 540

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Leu Pro Gln

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<213> Gluconobacter oxydans

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35 40 45

Glu Asn Tyr Arg His Ser Pro Leu Thr Gln Ile Thr Thr Glu Asn Val
50 55 60

Gly Gln Leu Gln Leu Val Trp Ala Arg Gly Met Gln Pro Gly Lys Val
65 70 75 80

Gln Val Thr Pro Leu Ile His Asp Gly Val Met Tyr Leu Ala Asn Pro
85 90 95

Gly Asp Val Ile Gln Ala Ile Asp Ala Lys Thr Gly Asp Leu Ile Trp
100 105 110

Glu His Arg Arg Gln Leu Pro Asn Ile Ala Thr Leu Asn Ser Phe Gly
115 120 125

Glu Pro Thr Arg Gly Met Ala Leu Tyr Gly Thr Asn Val Tyr Phe Val
130 135 140

Ser Trp Asp Asn His Leu Val Ala Leu Asp Thr Ala Thr Gly Gln Val
145 150 155 160

Thr Phe Asp Val Asp Arg Gly Gln Gly Glu Asp Met Val Ser Asn Ser

165 170 175

Ser Gly Pro Ile Val Ala Asn Gly Val Ile Val Ala Gly Ser Thr Cys
180 185 190

Gln Tyr Ser Pro Phe Gly Cys Phe Val Ser Gly His Asp Ser Ala Thr
195 200 205

Gly Glu Glu Leu Trp Arg Asn Tyr Phe Ile Pro Arg Ala Gly Glu Glu
210 215 220

Gly Asp Glu Thr Trp Gly Asn Asp Tyr Glu Ala Arg Trp Met Thr Gly
225 230 235 240

Val Trp Gly Gln Ile Thr Tyr Asp Pro Val Gly Gly Leu Val His Tyr
245 250 255

Gly Ser Ser Ala Val Gly Pro Ala Ser Glu Thr Gln Arg Gly Thr Thr
260 265 270

Gly Gly Thr Met Tyr Gly Thr Asn Thr Arg Phe Ala Val Arg Pro Glu
275 280 285

Thr Gly Glu Ile Val Trp Arg His Gln Thr Leu Pro Arg Asp Asn Trp
290 295 300

Asp Gln Glu Cys Thr Phe Glu Met Met Val Ala Asn Val Asp Val Gln
305 310 315 320

Pro Ala Ala Asp Met Asp Gly Val Arg Ser Ile Asn Pro Asn Ala Ala
325 330 335

Thr Gly Glu Arg Arg Val Leu Thr Gly Val Pro Cys Lys Thr Gly Thr
340 345 350

Met Trp Gln Phe Asp Ala Glu Thr Gly Glu Phe Leu Trp Ala Arg Asp
355 360 365

Thr Ser Tyr Glu Asn Ile Ile Glu Ser Ile Asp Glu Asn Gly Ile Val
370 375 380

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Thr Val Asp Glu Ser Lys Val Leu Thr Glu Leu Asp Thr Pro Tyr Asp
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Val Cys Pro Leu Leu Leu Gly Gly Arg Asp Trp Pro Ser Ala Ala Leu
                405                 410                 415

Asn Pro Asp Thr Gly Ile Tyr Phe Ile Pro Leu Asn Asn Thr Cys Met
            420                 425                 430

Asp Ile Glu Ala Val Asp Gln Glu Phe Ser Ser Leu Asp Val Tyr Asn
        435                 440                 445

Gln Ser Leu Thr Ala Lys Met Ala Pro Gly Lys Glu Leu Val Gly Arg
    450                 455                 460

Ile Asp Ala Ile Asp Ile Ser Thr Gly Arg Thr Leu Trp Thr Ala Glu
465                 470                 475                 480

Arg Glu Ala Ser Asn Tyr Ala Pro Val Leu Ser Thr Ala Gly Gly Val
                485                 490                 495

Leu Phe Asn Gly Gly Thr Asp Arg Tyr Phe Arg Ala Leu Ser Gln Glu
            500                 505                 510

Thr Gly Glu Thr Leu Trp Gln Thr Arg Leu Ala Thr Val Ala Ser Gly
        515                 520                 525

Gln Ala Val Ser Tyr Glu Ile Asp Gly Val Gln Tyr Ile Ala Ile Gly
    530                 535                 540

Gly Gly Gly Thr Thr Tyr Gly Ser Phe His Asn Arg Pro Leu Ala Glu
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Pro Gln Gln
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<213> Gluconobacter oxydans

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<223>

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Ala Asn Pro Pro Ala Gly Glu Trp Ile Asn Tyr Gly Gln Asn Gln Glu
        35                  40                  45

Asn Tyr Arg His Ser Pro Leu Thr Gln Ile Thr Ala Asp Asn Val Gly
    50                  55                  60

Gln Leu Gln Leu Val Trp Ala Arg Gly Met Glu Ala Gly Lys Ile Gln
65                  70                  75                  80

Val Thr Pro Leu Val His Asp Gly Val Met Tyr Leu Ala Asn Pro Gly
                85                  90                  95

Asp Val Ile Gln Ala Ile Asp Ala Ala Thr Gly Asp Leu Ile Trp Glu
            100                 105                 110

His Arg Arg Gln Leu Pro Asn Ile Ala Thr Leu Asn Ser Phe Gly Glu
        115                 120                 125

Pro Thr Arg Gly Met Ala Leu Tyr Gly Thr Asn Val Tyr Phe Val Ser
    130                 135                 140

Trp Asp Asn His Leu Val Ala Leu Asp Thr Ser Thr Gly Gln Val Val
145                 150                 155                 160

Phe Asp Val Asp Arg Gly Gln Gly Thr Asp Met Val Ser Asn Ser Ser
                165                 170                 175

Gly Pro Ile Val Ala Asn Gly Val Ile Val Ala Gly Ser Thr Cys Gln
            180                 185                 190
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Tyr Ser Pro Phe Gly Cys Phe Val Ser Gly His Asp Ser Ala Thr Gly
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Glu Glu Leu Trp Arg Asn Thr Phe Ile Pro Arg Ala Gly Glu Glu Gly
    210                 215                 220

Asp Glu Thr Trp Gly Asn Asp Tyr Glu Ala Arg Trp Met Thr Gly Val
225                 230                 235                 240

Trp Gly Gln Ile Thr Tyr Asp Pro Val Gly Gly Leu Val His Tyr Gly
                245                 250                 255

Thr Ser Ala Val Gly Pro Ala Ala Glu Ile Gln Arg Gly Thr Val Gly
            260                 265                 270

Gly Ser Met Tyr Gly Thr Asn Thr Arg Phe Ala Val Arg Pro Glu Thr
        275                 280                 285

Gly Glu Ile Val Trp Arg His Gln Thr Leu Pro Arg Asp Asn Trp Asp
    290                 295                 300

Gln Glu Cys Thr Phe Glu Met Met Val Val Asn Val Asp Val Gln Pro
305                 310                 315                 320

Ser Ala Glu Met Glu Gly Leu His Ala Ile Asn Pro Asp Ala Ala Thr
                325                 330                 335

Gly Glu Arg Arg Val Val Thr Gly Val Pro Cys Lys Asn Gly Thr Met
            340                 345                 350

Trp Gln Phe Asp Ala Glu Thr Gly Glu Phe Leu Trp Ala Arg Asp Thr
        355                 360                 365

Ser Tyr Gln Asn Leu Ile Glu Ser Val Asp Pro Asp Gly Leu Val His
    370                 375                 380

Val Asn Glu Asp Leu Val Val Thr Glu Leu Glu Val Ala Tyr Glu Ile
385                 390                 395                 400

Cys Pro Thr Phe Leu Gly Gly Arg Asp Trp Pro Ser Ala Ala Leu Asn
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405 410 415

Pro Asp Thr Gly Ile Tyr Phe Ile Pro Leu Asn Asn Ala Cys Ser Gly
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Met Thr Ala Val Asp Gln Glu Phe Ser Ser Leu Asp Val Tyr Asn Val
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Ser Leu Asp Tyr Lys Leu Ser Pro Gly Ser Glu Asn Met Gly Arg Ile
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Asp Ala Ile Asp Ile Ser Thr Gly Arg Thr Leu Trp Ser Ala Glu Arg
465 470 475 480

Tyr Ala Ser Asn Tyr Ala Pro Val Leu Ser Thr Gly Gly Gly Val Leu
485 490 495

Phe Asn Gly Gly Thr Asp Arg Tyr Phe Arg Ala Leu Ser Gln Glu Thr
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Gly Glu Thr Leu Trp Gln Thr Arg Leu Ala Thr Val Ala Ser Gly Gln
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Ala Ile Ser Tyr Glu Ile Asp Gly Val Gln Tyr Val Ala Ile Gly Arg
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565 570 575

Gln Gln

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<211> 579
<212> PRT
<213> Gluconobacter oxydans

<220>
<221> SIGNAL
<222> (1)..(23)

<223>

<400> 8

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Leu Ala Asn Pro Pro Ala Gly Glu Trp Ile Asn Tyr Gly Arg Asn Gln
        35                  40                  45

Glu Asn Tyr Arg His Ser Pro Leu Thr Gln Ile Thr Ala Asp Asn Val
    50                  55                  60

Gly Gln Leu Gln Leu Val Trp Ala Arg Gly Met Glu Ala Gly Ala Val
65                  70                  75                  80

Gln Val Thr Pro Met Ile His Asp Gly Val Met Tyr Leu Ala Asn Pro
                85                  90                  95

Gly Asp Val Ile Gln Ala Leu Asp Ala Gln Thr Gly Asp Leu Ile Trp
            100                 105                 110

Glu His Arg Arg Gln Leu Pro Ala Val Ala Thr Leu Asn Ala Gln Gly
        115                 120                 125

Asp Arg Lys Arg Gly Val Ala Leu Tyr Gly Thr Ser Leu Tyr Phe Ser
    130                 135                 140

Ser Trp Asp Asn His Leu Ile Ala Leu Asp Met Glu Thr Gly Gln Val
145                 150                 155                 160

Val Phe Asp Val Glu Arg Gly Ser Gly Glu Asp Gly Leu Thr Ser Asn
                165                 170                 175

Thr Thr Gly Pro Ile Val Ala Asn Gly Val Ile Val Ala Gly Ser Thr
            180                 185                 190

Cys Gln Tyr Ser Pro Tyr Gly Cys Phe Ile Ser Gly His Asp Ser Ala
        195                 200                 205
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Thr Gly Glu Glu Leu Trp Arg Asn His Phe Ile Pro Gln Pro Gly Glu
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Glu Gly Asp Glu Thr Trp Gly Asn Asp Phe Glu Ala Arg Trp Met Thr
225                 230                 235                 240

Gly Val Trp Gly Gln Ile Thr Tyr Asp Pro Val Thr Asn Leu Val Phe
                245                 250                 255

Tyr Gly Ser Thr Gly Val Gly Pro Ala Ser Glu Thr Gln Arg Gly Thr
            260                 265                 270

Pro Gly Gly Thr Leu Tyr Gly Thr Asn Thr Arg Phe Ala Val Arg Pro
        275                 280                 285

Asp Thr Gly Glu Ile Val Trp Arg His Gln Thr Leu Pro Arg Asp Asn
    290                 295                 300

Trp Asp Gln Glu Cys Thr Phe Glu Met Met Val Ala Asn Val Asp Val
305                 310                 315                 320

Gln Pro Ser Ala Glu Met Glu Gly Leu Arg Ala Ile Asn Pro Asn Ala
                325                 330                 335

Ala Thr Gly Glu Arg Arg Val Leu Thr Gly Ala Pro Cys Lys Thr Gly
            340                 345                 350

Thr Met Trp Ser Phe Asp Ala Ala Ser Gly Glu Phe Leu Trp Ala Arg
        355                 360                 365

Asp Thr Asn Tyr Thr Asn Met Ile Ala Ser Ile Asp Glu Thr Gly Leu
    370                 375                 380

Val Thr Val Asn Glu Asp Ala Val Leu Lys Glu Leu Asp Val Glu Tyr
385                 390                 395                 400

Asp Val Cys Pro Thr Phe Leu Gly Gly Arg Asp Trp Ser Ser Ala Ala
                405                 410                 415

Leu Asn Pro Asp Thr Gly Ile Tyr Phe Leu Pro Leu Asn Asn Ala Cys
            420                 425                 430
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Tyr Asp Ile Met Ala Val Asp Gln Glu Phe Ser Ala Leu Asp Val Tyr
435 440 445

Asn Thr Ser Ala Thr Ala Lys Leu Ala Pro Gly Phe Glu Asn Met Gly
450 455 460

Arg Ile Asp Ala Ile Asp Ile Ser Thr Gly Arg Thr Leu Trp Ser Ala
465 470 475 480

Glu Arg Pro Ala Ala Asn Tyr Ser Pro Val Leu Ser Thr Ala Gly Gly
485 490 495

Val Val Phe Asn Gly Gly Thr Asp Arg Tyr Phe Arg Ala Leu Ser Gln
500 505 510

Glu Thr Gly Glu Thr Leu Trp Gln Ala Arg Leu Ala Thr Val Ala Thr
515 520 525

Gly Gln Ala Ile Ser Tyr Glu Leu Asp Gly Val Gln Tyr Ile Ala Ile
530 535 540

Gly Ala Gly Gly Leu Thr Tyr Gly Thr Gln Leu Asn Ala Pro Leu Ala
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Glu Ala Ile Asp Ser Thr Ser Val Gly Asn Ala Ile Tyr Val Phe Ala
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Leu Pro Gln

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ttccgcctcg gctctcgccc ag 82

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Met Lys Ile Lys Thr Gly Ala Arg Ile Leu Ala Leu Ser Ala Leu Thr
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Thr Met Met Phe Ser Ala Ser Ala Leu Ala Gln
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